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ABSTRACT

To gather data for the evaluation of the Vocational Electronics and Integrated Secondary/Post-Secondary Curriculum guide so as to assess its status, questionnaires were distributed to Utah's 32 secondary vocational instructors, and interviews were conducted with all the post-secondary instructors. Findings and conclusions reached include: (1) The guide is generally not accepted by the high school teachers, (2) The level of the guide is beyond the cognitive domain of many high school students, (3) The guide calls for equipment which is not accessible to instructors, (4) The term articulation and its application to the guide are not fully understood by high school instructors, (5) All teachers do not have access to a guide, and (6) By and large, students are able to enroll in post-secondary institutions with advanced standing. (SN)

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FINAL REPORT

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THE STATUS OF THE INTEGRATED ELECTRONICS GUIDE PROGRAM WITHIN THE STATE OF UTAH

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THE STATUS OF THE INTEGRATED ELECTRONICS GUIDE PROGRAM WITHIN THE STATE OF UTAH

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THE STATUS OF THE INTEGRATED ELECTRONICS GUIDE PROGRAM WITHIN THE STATE OF UTAH

Background

High school and post-high school instructors in the occupational area of electronics have for several years expressed concern about students being able to move from high school vocational classes into post-high school vocation programs without having to repeat much of the skill training received in high school. In 1969 the Vocational-Technical Division of the State Board of Education under the direction of Walter E. Ulrich, Division Administrator and Dave Gailey, Post-high School Coordinator appointed a specialist committee composed of both high school and post-high school instructors to develop a curriculum guide for the electronics program. The members of the curriculum specialist committee included Don James of Utah Technical College of Provo, Leon DeVries of Cyprus High School, Max Belnap of Clearfield High School, and Gerrold Mukai of Weber State College. In 1971 Mukai accepted another position, and Roy France of Utah State University took Mukai's place on the committee.

The Curriculum Specialists Committee was given the responsibility of sorting through the body of basic electronic technology and develop a curriculum which would hopefully meet the needs of the electronics program. This was a preliminary step toward the direction of a total articulation from the high school to the post-high school.

As the curriculum committee began their efforts they reviewed several sources and guides that had been developed by industry, school districts, university and college institutions, individuals, and military. The committee were especially influenced by the United States Air Force Curriculum.

Some members of the curriculum committee participated in a grant sponsored by the U.S. Office of Education who is managing "The Utah Project," where according to Nisos, who was managing director of Aerospace Education Foundation, had this to say:

> Air Force course materials, selected by Utah administrators and teachers, were tested in five Utah schools to determine their effectiveness in civilian setting. Portions of three courses tested included electronics principles, aircraft pneudraulics, and medical laboratory technician (nurse's aids).[1]

These course materials were used in the schools and compared and evaluated against the conventional ways teachers were using them. The evaluation was conducted by an independent source. An article that appeared in the government publication New Thrusts in Vocational Education, reported:

> Could the average high school post-secondary technical school, or college vocational instructor adapt to the military approach to education, even in technical area?
>
> Three Air Force courses were finally selected and scheduled for testing:
>
> One was a 90-hour segment from the Air Force standardized electronic principles course, to be tested at Weber State College at Ogden; Dixie College at St. George; Utah Technical College at its Provo and Salt Lake campuses; and Jordan High School in Salt Lake.[2]

Nisos had stated at the conclusion of the comparison study:

> Utah, with its own funds, has purchased the entire Air Force Electronics Principles course, amounting to 540 hours of instruction, including some 240 hours of motion picture film.[3]

---

[1]Michael J. Nisos, "Sharing Air Force's Education Know-How," Air Force Magazine (December, 1971), pp. 115-117.

[2]U.S. Department of Health, Education, and Welfare, New Thrusts in Vocational Education (Washington, D.C.: U.S. Department of Health, Education and Welfare, 1971), pp. 17-19.

[3]Nisos, p. 116.

The curriculum committee had this experience as well as other individual experiences to draw upon for the task assigned. Mathematics for electronics was reviewed and standards of achievement on the high school, college, and industrial level for articulation were established.

It was decided that the behavioral objectives, or criterion-referenced course approach to education would be implemented into the guide. Members of the committee had had experience and training in writing their behavioral objectives under the direction of Mager.

Statement of Problem

Many instructional guides are available in electronics which contain numerous teaching techniques for the instructor to follow. The purpose of this research was to gather data for evaluation of the Vocational Electronics, and Integrated Secondary Post-Secondary Curriculum Guide.

Objectives

The specific objectives of this study were:

1. The extent to which the instructors were using the guide.
2. Student reaction to this behavioral objective method of instruction.
3. The extent to which articulation of instruction increased or decreased between the secondary and post-secondary schools since the new guides have been available.
4. Compilation of recommended changes given by the instructors who have used the guide.
5. Compilation of author's titles, and annotations of guides that instructors were using other than the state guide for electronics.
6. The instructor's reasons for not using the state guide and list them in ranked order.

7. The extent to which efficiency and effectiveness of the instruction has increased at the secondary and post-secondary levels since adopting the new guide.

Procedure

The procedure of this study was essentially carried out in five general steps. They were: (1) development of the questionnaire, (2) dissemination and collection of the questionnaires, (3) the tabulation and analysis of the data, (4) interview conducted at post-secondary institutions in the state of Utah, (5) summarizing and reporting of the data.

Presentation of Data

The material presented in this section is the tabulation of the questionnaires sent to the secondary vocational electronics instructors in the state of Utah.

Beginning in the fall of 1971, the questionnaire was designed to answer the above objectives. The preparation was made by the writer, Industrial Education Department Staff as well as representatives of the Utah State Division of Vocational and Technical Education for recommendations and revision.

Thirty-two questionnaires were mailed on January 15, 1972, of which 29 or 90.6 percent returned completed questionnaires that were usable in this study. Three instructors did not answer the questionnaire. Of the 29 instructors responding, seven indicated they were not presently teaching vocational electronics classes. Twenty-one of the 22 instructors who are presently teaching vocational classes, have a copy of the state vocational articulated curriculum guide.

Analysis of Data

The instructors were asked to indicate the extent to which they were using the guide. The choices available were (1) completely, (2) partially, (3) not at all. Nine indicated that they were using the guide completely, while twelve indicated they were using the guide partially. Only one indicated that he was not using the guide at all. The instructors' responses are presented in Table 1.

Table 1. Extent the Instructors Are Using the Guide

Instructors indication of extent of use of the guide	Number responding	Percentage
Using the guide completely	9	40
Using the guide partially	12	56
Not using the guide at all	1	4
Total	22	100

The instructors were asked to indicate the changes that they felt were needed in the guide. Eight responded--two each on transistors and transistor applications, and vacuum tubes, one each on four items as is outlined in Table 2.

Instructors who indicated that they were using the guide partially, were asked to list their reasons for not using the guide completely. Twenty-two responded, nine replied that the guide was written at too high a level for the students which is a significant number and needs to be considered. Five instructors indicated that they lacked enough equipment to use the guide. Table 3 illustrates the recommended changes suggested by this group. The average number of years that instructors have used the guide partially was

1.8 years. The average number of years those instructors have used the guide completely was 1.75 years.

Table 2. List of Compiled Changes that the Instructors Who are Using the Guide Completely Felt Were Needed.

Changes needed	Number Responding
Transistors and Transistor Applications	2
Vacuum Tubes and Semi-conductors	2
More depth in the use of equipment	1
Development of Lab and Projects for each unit	1
Combining of unit 5 with unit 7	1
Unit 6 and unit 7 were written at too high a level for students	1
Total	8

Table 3. List of Compiled Changes Suggested by Instructors Who Are Using The Guide Partially.

Reasons listed	Number Responding
Guide is written at too high a level for students	9
Lack enough proper equipment	5
Students become dis-interested through the manner of presentation of material identified in the guide	5
Guide is not a complete enough program	2
Instructor has more important material to present that the guide omits	1
Total	22

Those instructors who indicated that they were using the guide partially or not at all, were asked to list the name of the guide or guides that they were using. Two of the three instructors responding indicated that they had developed their own guide. One instructor indicated that he was using a guide developed by Lab Volt Corporation. Nine failed to respond.

Those instructors who used the guide completely rated the guide in this fashion: Three thought the guide was excellent, seven rated the guide as good, there were no responses for fair or poor. Those who used the guide completely were also asked to compare the previous guide or program they were using to the present program where the guide outlines the work load. Five indicated that their program is now easier to teach; one indicated that the program now is more difficult to teach. Seven made no response.

Each instructor was asked to rate the state guide as compared to other guides with which they were acquainted. Nine instructors stated that the new state guide was better, two indicated the guide is equivalent to other guides. There were no responses for not as good and very poor. Eleven failed to respond to this question.

The instructors were asked to indicate whether the students who successfully completed their program were able to gain entry level jobs. Seven instructors who use the guide completely indicated that students were successful in gaining entry level jobs, while one instructor in this group indicated his students were not gaining entry level jobs. Of those instructors using the guide partially, three indicated their students were gaining entry level jobs. Of this group there were no instructors who indicated that their students were not able to gain entry level jobs. The instructor who did not have a copy of the guide stated that his students were gaining entry level jobs. Ten instructors did not respond to this question.

Instructors were asked to respond to the question about students completing their program being able to enroll in a post-secondary high school vocational electronics program at an advanced standing. A total of 22 instructors responded to this question or 50 percent of the instructors teaching vocational classes in electronics in Utah. Table 4 presents this information as well as instructors responses to entry level jobs.

Table 4. Instructors Indication of the Status of Students Who Complete Their Programs as Far as Job Placement and Advanced Standing in Post-Secondary Institutions.

Instructor's indication of the extent of use of guide	Number of programs where students are gaining advanced placement	Number of programs where students are gaining entry level jobs
Using the guide completely	7	7
Using the guide partially	6	3
Not using the guide at all	1	1
No response	8	11
Total	22	22

Interviews with Post-Secondary Institutions

The interviews of the post-secondary institutions in Utah included: Utah Technical College at Provo; Utah Technical College at Salt Lake; Weber State College at Ogden; and Utah State University at Logan.

James, at Utah Technical College at Provo, indicated that in the past four years there have been a total of six students from the high schools in Utah accepted into the electronics program at an advanced standing. The students accepted into their program were not enrolled in the high school classes at the time the guides were available.

Christensen, at Utah Technical College at Salt Lake, indicated that over the past four years, ten students have been accepted into their program in electronics at advanced standings. The students at this institution were not enrolled at the time the guide was available.

France, at Utah State University at Logan, related the same type information; students enrolled in this program were not enrolled in high schools at the time when the guide was being used in the high school instruction.

Urie, at Weber State College at Ogden, indicated that due to the depth of study of their electronics program, it was not feasible to offer advanced standing to students which had the limited background offered by the guide.

At the present time, three of the four institutions have made plans and preparations for articulation at advanced standing for students that are properly prepared and desire to request advanced standing. Presently the post-secondary institutions have not received students from high schools where the guide was being used.

Summary of Findings

The state of Utah, under the direction of Dr. Gailey and Mr. Ulrich of the Vocational-Technical Division of the Board of Education, appointed a Specialist Committee to develop a curriculum guide for the electronics program. The committee began their work in the summer of 1968 and have continued each summer since to improve and change needed areas of the guide.

The purpose of this study was to determine the status of the guide. The extent to which it is being used, if articulation has occurred at post-secondary institutions, compile suggested changes given be instructors using the guide, and determine reasons why instructors have not adopted the state guide.

The procedure for this study was carried out in five general steps. They were: development of the questionnaire, dissemination and collection of questionnaires, the tabulation and analysis of the data, interview conducted at post-secondary institutions, and finally the summarizing and reporting of data.

The data reported in this study were obtained from 22 instructors who are presently teaching vocational electronics classes in the high schools in the state of Utah.

The following generalizations were drawn from the findings in this study.

Findings Concerning the Instructors

1. Nine of the instructors were using the guide completely, while eleven instructors used the guide partially.

2. Instructors felt that units on transistors, semi-conductors and vacuum tubes needed to be added.

3. The major reasons given by instructors for not using the guide completely were: (1) the guide was written at too high a level for the students; (2) several schools lack proper equipment.

4. Other guides that are being used are Lab Volt, and instructor-developed guides.

5. High school instructors indicated that students graduating from their programs are gaining advanced standing in post-secondary institutions.

Findings of Post-Secondary Institutions

1. Post-secondary institutions have not received students from high schools where the guide was being used.

2. Three of the four post-secondary institutions are prepared to grant advanced standing to properly prepared students.

Conclusions

Based upon the results of this study, the following conclusions can be drawn:

The articulated curriculum guide for electronics was not generally accepted by the high school instructors.

The guide is written at too high a level for many high school students.

Instructors do not have enough equipment to properly use the guide.

Instructors in the high schools do not fully understand the term articulation and how it applies to the guide.

One instructor does not have a copy of the guide.

Students are able to enroll in post-secondary institutions at an articulated status.

Recommendations

Instructors at the high school level should be given further instruction in the use, purpose, and applications of the guide.

Efforts should be made to explain the meaning of articulation at advanced standing and how it applies to students' being taught at the high school level electronics program.

Efforts should be made to see that all instructors receive copies of the guide, and receive updated changes as they occur.

Minimum equipment needs for instructors should be developed to allow schools to make future plans for equipment needs.

An administrative decision needs to be made on the level to be accomplished by secondary and the level of acceptance by post high school.

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Nisos, Michael J. "Sharing Air Force's Educational Know-How." Air Force Magazine (December, 1971), pp. 115-117.

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APPENDIX

List of Post-Secondary Institutions Involved in the Study

Utah Technical College at Provo, Utah.

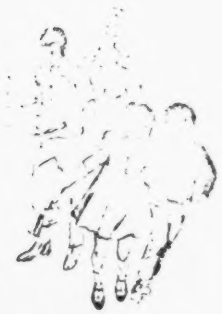
Utah Technical College at Salt Lake City, Utah.

Weber State College, Ogden, Utah.

Utah State University, Logan, Utah.

Interview Schedule of Post-Secondary Institutions

Date	Institution	Person Interviewed
1 March 1972	Utah Technical College Provo, Utah	Don James
1 March 1972	Utah Technical College Salt Lake City, Utah	Dallas Christensen
7 March 1972	Weber State College Ogden, Utah	Hurschell Urie
7 March 1972	Utah State University Logan, Utah	Edward L. France



UTAH STATE BOARD OF EDUCATION

1400 UNIVERSITY CLUB BUILDING, 136 EAST SOUTH TEMPLE STREET
SALT LAKE CITY, UTAH 84111

WALTER D. TALBOT, STATE SUPERINTENDENT OF PUBLIC INSTRUCTION

January 14, 1972

Dear Electronics Instructor:

Two years have passed since the Vocational Electronics, Integrated Secondary and Post Secondary guide has been available for use by the electronics teachers of the state.

We feel there is a need to evaluate this guide prior to further revisions. You, as an instructor of electronics, are the most knowledgeable concerning the usefulness and value of this guide.

We are asking you to respond to the enclosed questionnaire. Please take the five or ten minutes necessary to respond and return it to me in the enclosed stamped, self-addressed envelope today.

Thank you for your cooperation.

Sincerely,

Garth A. Hill

GARTH A. HILL, Specialist
Trade & Industrial Education

/ks

Enclosure

VAUGHN L. HALL, Deputy Superintendent
Office of Adult, Vocational and Rehabilitation Services

WALTER E. ULRICH, Administrator
Division of Vocational and Technical Education
Telephone (801) 328 5371

Questionnaire

UTAH STATE VOCATIONAL ELECTRONICS
SECONDARY - POST-SECONDARY CURRICULUM GUIDES
QUESTIONNAIRE

Please read each question carefully and make an appropriate response.

1. Are you presently teaching vocational electronics classes?

   Yes_____
   No_____

2. If you do not teach vocational electronics class or classes, go no further. Return this questionnaire.

3. Do you have a copy of the Utah State Vocational Electronics Secondary - Post-Secondary Curriculum Guide?

   Yes_____
   No_____

4. To what extent do you use the state vocational guide?

   Partially_____ For how many years?_____
   Completely_____ For how many years?_____
   Not at all_____

   If you do not use the guide, go to SECTION I.
   If you use the guide partially, go to SECTION II.
   If you use the guide completely, go to SECTION III.

SECTION I
(Not using guide)

Please indicate why you are not using the guide. Check all appropriate.

I. _____ A. The guide is not a complete enough program.

_____ B. Informational content of the guide is above what students can achieve.

_____ C. The guide is written at too low a level for my students.

_____ D. The guide does not fit my way of teaching.

_____ E. Do not know how to use the state guide.

_____ F. Do not have reference material to use the guide.

_____ G. Lack enough equipment to use the guide.

_____ H. Lack proper type of equipment to use the guide.

_____ I. Feel that I have more important materials to present that the guide omits.

_____ J. Think that the guide I am using is better than the state guide.

_____ K. Do not like to teach using behavioral objective techniques.

_____ L. Other reasons. _____

_____

_____

II. A. Did you develop the guide you are presently using?

Yes _____
No _____
Partially _____
If you did not, list the name of the guide you are using.

_____

GO TO SECTION IV

SECTION II
(Partially)

Please indicate why you have not adopted the State Vocational Electronics Guide completely. Check all that apply.

I. _____ A. The guide is not a complete enough program.

_____ B. Informational content of the guide is above what students can achieve.

_____ C. Guide is written at too high a level for my students.

_____ D. Guide is written at too low a level for my students.

_____ E. Students become disinterested through the manner of presentation of material identified in the guide.

_____ F. Do not have enough reference material to adequately use the guide.

_____ G. Lack enough equipment to adequately use the guide.

_____ H. Lack proper types of equipment to adequately use the guide.

_____ I. Feel that you have other more important materials to present that the guide omits.

_____ J. Think that the guide I am presently using is better than the state guide. Please list the name of the guide you are using.

_____

_____ K. Do not like to teach using behavioral objectives.

_____ L. Other reasons._____

_____

_____

II. A. Do you think the guide has enriched students in all academic subjects?

Yes_____

No_____

Please comment_____

_____

_____

GO TO SECTION IV

SECTION III
(Completely)

1. Rate your satisfaction with the results obtained through the use of the guide.

Excellent_____ Fair_____
Good _____ Poor_____

2. Please indicate the areas of the guide in which changes need to be made.

A. D. C. Section	Specific Area of Unit
_____Unit 1 Introduction to the Course	1._____
_____Unit 2 Basic Mathematics	2._____
_____Unit 3 Related Physics	3._____
_____Unit 4 Basic electrical Terms and Units	4._____
_____Unit 5 Measuring Instruments	5._____
_____Unit 6 Resistance, Ohms Law, Watts Law, Kirchhoffs Law and Circuits	6._____
_____Unit 7 D.C. Circuit Analysis	7._____
_____Unit 8 Principles of Magnetism	8._____
_____Unit 9 Meter Movements and Circuits	9._____
_____Unit 10 Inductance in Direct Current Circuits	10._____
_____Unit 11 Capacitance in Direct Current Circuits	11._____
A.C. Section	
_____Unit 1.Introduction to Alternating Current	1._____
_____Unit 2 Vectors and Phase in A.C. Circuits	2._____
_____Unit 3 Inductive Reactance and Impedance	3._____
_____Unit 4 Capacitance Reactance and Impedance	4._____
_____Unit 5 Series Combinations of Reactance Inductance, and Impedance	5._____
_____Unit 6 Parallel Combinations of R, L, and C	6._____
_____Unit 7 A.C. Circuit Analysis	7._____

_____Unit 8 The Transformer as a Coupling Circuit 8._____

B. _____List other units that should be contained in the guide.

_____

_____

_____No change

3. In your opinion, rate the differences between the state vocational guide and the guide you previously used.

The state vocational Guide is:

Better _____ Not as good_____

Equivalent_____ Very poor _____

4. Compared to my previous program's work load, the new vocational guide is:

Easier to teach _____

More difficult to teach_____

Less difficult to teach_____

5. Do you think the guide has enriched students in all academic subjects?

_____

_____

_____

SECTION IV

1. Have students that have successfully completed your class been able to enroll in a post high school vocational electronics program at an advanced standing?

Yes_____

No_____

2. Have students that have successfully completed your class been able to obtain entry level jobs in this field?

Yes_____

No_____